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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/699,758	XU, WEIZE
	Examiner	Art Unit
	Albert H. Cutler	2622

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 March 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-5,7-10 and 12-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-5,7-10 and 12-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 March 2007* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1. This office action is responsive to communication filed on March 16, 2007. Claims 1, 3-5, 7-10, and 12-14 are pending in the application. Claims 2, 6, and 11 have been cancelled by the Applicant.

Response to Arguments

2. Applicant's arguments filed March 16, 2007 have been fully considered but they are not persuasive.

3. Applicant asserts the arrangement of Rossi et al. would require at least at times, reading out both image sensor pixels and dark reference pixels.

4. The Examiner acknowledges that this is true. However, since the lower portion of the imaging array contains only dark pixels(figure 3a), and the pixels are sampled row-by-row(column 4, lines 25-28), Rossi et al. also teach of reading out rows of only dark reference pixels.

5. Applicant then asserts that the process of Rossi et al. uses current and not voltage.

6. The Examiner maintains that voltages are indeed used, as dark reference signals are read out using the same signal paths as clear pixels, and a reset signal **voltage** Vrst is subtracted from an image signal **voltage** Vsig, yielding a voltage which **represents** dark current(column 4, lines 18-44). See also column 5, lines 5-52. A value, I_{dark}, is calculated which is **representative** of dark current(see equation 5, column 5, line 14). This value is simply representative of dark current levels, and is calculated using measured voltage readings obtained by the circuit in figure 3b. Therefore, the value I_{dark}

is not an actual measured current value, but rather a representative value for dark pixel signals calculated from measured voltage values of Vrst and Vsig.

7. Applicant argues that sample and hold circuits are not used for reading out dark current signals but only imager pixels. Current mirrors are used in the read out of dark reference pixels.

8. The Examiner agrees that the sample and hold circuits of Rossi et al. are indeed used for reading out imager pixels. However, the sample and hold circuits of Rossi et al. are also used for sampling voltages of the dark reference pixels over the same signal paths to obtains values **representing** dark current(column 4, lines 18-44). Furthermore, Rossi et al. make no reference to so-called current mirrors.

9. Applicant argues, with respect to Borg, that no sample and hold circuit is used. There is no operational amplifier used to provide an average signal.

10. The Examiner asserts that sample and hold circuitry is used in reference signal column amplifier 38(Borg, paragraph 0023). Borg further teaches of an amplifier providing an average signal, as the output of column amplifier 38 produces an offset, average reference pixel signal. The dark reference signals are averaged prior to being subjected to column amplifier 38 by having their outputs shorted together(paragraphs 0021 and 0025). The amplifier then takes the average dark reference signal as one input, a voltage Vcm as the other output, and outputs an augmented average dark reference signal(paragraph 0023). Therefore, the amplifier produces an average dark reference signal, albeit with a DC bias.

11. Applicant argues that neither Rossi et al. or Borg contain sample and hold circuits.

12. The Examiner maintains that both Rossi et al. and Borg contain sample and hold circuits. See Rossi et al., 33, figure 3b, figure 3c, column 4, lines 14-55. See Borg, paragraph 0023.

13. Applicant argues that Rossi et al. uses current mirrors, and Borg uses a buffer amplifier.

14. The Examiner disagrees with the assertion that Rossi et al. uses current mirrors(see above rationale), and acknowledges that Borg uses a buffer(34, paragraph 0022). However, the working of any amplifier of Borg is irrelevant, as there is no amplifier lacking in Rossi et al., and thus Borg is not needed to cure any amplifier deficiency. The amplifier of Rossi et al.(35, figure 3b) takes a dark pixel signal and subtracts a reset signal(see figure 3b), which would yield an offset dark pixel signal. Borg similarly uses an amplifier(38, figure 2) to take a dark reference signal and supply an offset(see above rationale).

15. Applicant fails to see how Rossi et al. and Borg combine.

16. The Examiner refutes that Rossi et al. teach almost every aspect of the instant application. Where Rossi et al. differ is that an average dark reference signal is not produced, as pixel signals are read out of the sample and hold circuits row-by-row and also column-by-column. However, Borg teaches of the benefit of combining rows of dark reference pixels to create an average signal(Borg, paragraphs 0021-0025). Borg teaches that the pixel signal lines of the dark reference pixels are shorted together

before going into the amplifier to produce an average signal. Rossi et al. similarly teach that the pixel signal lines are shorted together before going into the amplifier(see figure 3b). However, Rossi et al. teach that the signals are read out on the common signal line one at a time to produce dark reference signals, and Borg teaches that the pixel signals are read out simultaneously to produce an average signal. Therefore, the overall structure of Rossi et al. needs no change when combined with Borg. Simply put, the timing of the readout of the dark reference signals from the sample and hold circuits of Rossi et al. would be adjusted so that the dark reference signals are read out to the operational amplifier simultaneously as taught by Borg to average the signals and provide the benefit of eliminating shot noise and row-wise fixed pattern noise(Borg, paragraph 0025).

17. Applicant argues that Rossi et al. does not provide an image sensor having rows and columns of pixels, the upper portion includes rows of image capture pixels, the bottom portion includes rows of dark signal pixels.

18. Rossi et al. teaches an image sensor(30, figures 3a and 3b) having rows and columns of pixels(figure 3b), the upper portion includes rows of image capture pixels(See figure 3a. The upper portion includes rows of image capture pixels, column 4, lines 23-30.), the bottom portion includes rows of dark signal pixels(See figure 3a. The bottom portion includes rows containing only dark signal pixels.).

19. Therefore, the Examiner is maintaining the rejection.

Claim Rejections - 35 USC § 103

20. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

21. Claims 1, 3-5, 7-10, and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rossi et al.(US Patent 6,974,973) in view of Borg(European Patent Application Publication 1,117,250 A2).

The Examiner's responses to Applicants arguments, as outlined above, are hereby incorporated into the rejections of claims 1, 3-5, 7-10, and 12-14 by reference.

Consider claim 1, Rossi et al. teaches:

A method for outputting signals from dark reference pixels(column 4, lines 23 through column 5, line 36), the method comprising the steps of:

(a) transferring signals from a plurality of dark reference pixels(figure 3a, "FIG. 3a shows peripheral areas 31 of a pixel array 30 which contains dark pixels from which dark current measurements are taken. The dark pixels in peripheral areas 31 are read-out using the same signal path and timing diagram as for clear pixels in area 32 which are used for imaging." Column 4, lines 18-22) to a plurality of storage circuit elements(The pixels are transferred to "sample and hold circuits"(33, figure 3b, figure 3c, column 4, lines 24-28)). and

(b) transferring signals from each of the plurality of storage circuit elements(sample and hold circuits, 33) to an operational amplifier(35, figure 3b, column 4, lines 33-35. The pixels are transferred to a differential amplifier(i.e. operational amplifier, 35) where they are subtracted.) which operational amplifier(35) produces a signal from the signals from the sample and hold circuits(The sample and hold circuits(33) produce two signals for each pixel, Vsig and Vrst. These signals are subtracted to produce a dark current signal that is used as a reference. Column 4, lines 28-35) for providing a approximate dark reference signal(The signals output a dark reference signal which is input into an image processor(37), which uses the dark reference signals to perform sensor temperature calculations. Column 4, lines 36-40).

However, Rossi et al. does not explicitly teach that the dark pixels contained in the peripheral area of the pixel array, as shown in figure 3a, are substantially shielded from light. Rossi et al. does not explicitly teach that the pixels are read out simultaneously, or on one clock cycle, from the sample and hold circuits(33). Nor does Rossi et al. teach that the operational amplifier(35) produces a substantially average signal from all the signals in the sample and hold circuits(33).

Borg teaches of improving a reference signal obtained from dark pixels. Borg teaches that an improved reference signal is needed because many reference signals do not accurately compensate for noise and other influences to which pixel cells are subjected(paragraph 0007). Like, Rossi et al., Borg teaches of a plurality of dark reference pixels(3, figure 2, numbers 21, 31, and 41 refer to columns of dark reference pixels, paragraph 0020). Also like Rossi et al., Borg teaches that the dark pixel outputs

are fed into an operational amplifier(38, figure 2) to produce a reference signal(see figure 2, paragraph 0022).

However, in addition to the teachings of Rossi et al., Borg teaches that the dark pixels are substantially shielded from light("covered with an opaque filter that blocks light", paragraph 0021). In addition, Borg teaches that the pixels are read out simultaneously, or on one clock cycle(The pixels are read out "on a row-by-row basis", paragraph 0018. Reading pixels out "row-by-row" means that an entire row of pixels is read out at the same time(i.e. simultaneously or on one clock cycle)). Furthermore, Borg teaches that the operational amplifier(38) produces a substantially average signal from all the dark reference signals("By shorting the sense nodes of many reference pixels together, differences in the dark current from pixel to pixel, as well as shot noise associated with the dark current are averaged out" paragraph 0025. The outputs from the pixels are shorted together into the operational amplifier(38) with a common mode voltage Vcm, and an average dark reference signal is output. Paragraphs 23 and 25).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to combine the outputs of all of the sample and hold circuits of Rossi et al., as Borg does with the outputs of all the dark reference pixels, and read the dark reference values out to the operational amplifier simultaneously or on one clock cycle as taught by Borg, in order to produce an average dark reference signal from the operational amplifier, in which the signal more accurately compensates for noise and other influences to which the pixel cells are subjected(Borg, paragraphs 0007 and 0025).

Consider claim 3, and as applied to claim 2 above, Rossi et al. further teaches of providing a differential operational amplifier(35) as the operational amplifier(The sample and hold circuits(33) produce a two signals for each pixel, Vsig and Vrst. These signals are subtracted using a differential amplifier to produce a dark current signal that is used as a reference. Column 4, lines 28-35)

Consider claim 4, and as applied to claim 1 above, Rossi et al. further teaches that step (a) further comprises transferring the pixel signals from the plurality of pixels to the plurality of storage elements(sample and hold circuits) on a row-by-row basis("The sample and hold circuits 33 sample signals from array 30 row-by-row" column 4, lines 25-29).

Consider claim 5, Rossi et al. teaches:

An image sensor assembly(figures 3a 3b and 3c) comprising:

(a) a plurality of active pixels(figure 3a, 32, "clear pixels") that receives incident light that is converted into a charge("Imaging sensors are used to capture visible light", column 1, line 15);

(b) a plurality of storage element circuits(sample and hold circuits(33));

(c) a plurality of dark reference pixels(figure 3a, "FIG. 3a shows peripheral areas 31 of a pixel array 30 which contains dark pixels from which dark current measurements are taken. The dark pixels in peripheral areas 31 are read-out using the same signal

path and timing diagram as for clear pixels in area 32 which are used for imaging." Column 4, lines 18-22) each of which is responsive to light(because the dark pixels are constructed on the same image sensor as the light ones(figure 3a), they are thus, responsive to light), wherein signals from each of the dark reference pixels is transferred to one of the storage element circuits(The dark pixels in peripheral areas 31 are read-out using the same signal path and timing diagram as for clear pixels in area 32 which are used for imaging." Column 4, lines 18-22. Each pixel provides two signals, Vsig and Vref to a sample and hold circuit(33). Column 4, lines 45-49); and

(d) an operational amplifier that receives a signal from each of the sample and hold circuits(35, figure 3b, column 4, lines 33-35. The pixels are transferred to a differential amplifier(i.e. operational amplifier, 35) where they are subtracted.), wherein the operational amplifier(35) produces a signal from the signals from the sample and hold circuits(The sample and hold circuits(33) produce two signals for each pixel, Vsig and Vrst. These signals are subtracted to produce a dark current signal that is used as a reference. Column 4, lines 28-35) for providing an approximate dark reference pixel (The signals output a dark reference signal which is input into an image processor(37), which uses the dark reference signals to perform sensor temperature calculations. Column 4, lines 36-40)

However, Rossi et al. does not explicitly teach that the dark pixels contained in the peripheral area of the pixel array, as shown in figure 3a, are substantially shielded from light. Rossi et al. does not explicitly teach that the pixels are read out simultaneously, or on one clock cycle, from the sample and hold circuits(33). Nor does

Rossi et al. teach that the operational amplifier(35) produces a substantially average signal from all the signals in the sample and hold circuits(33).

Borg teaches of improving a reference signal obtained from dark pixels. Borg teaches that an improved reference signal is needed because many reference signals do not accurately compensate for noise and other influences to which pixel cells are subjected(paragraph 0007). Like, Rossi et al., Borg teaches of a plurality of dark reference pixels(3, figure 2, numbers 21, 31, and 41 refer to columns of dark reference pixels, paragraph 0020). Also like Rossi et al., Borg teaches that the dark pixel outputs are fed into an operational amplifier(38, figure 2) to produce a reference signal(see figure 2, paragraph 0022).

However, in addition to the teachings of Rossi et al., Borg teaches that the dark pixels are substantially shielded from light("covered with an opaque filter that blocks light", paragraph 0021). In addition, Borg teaches that the pixels are read out simultaneously, or on one clock cycle(The pixels are read out "on a row-by-row basis", paragraph 0018. Reading pixels out "row-by-row" means that an entire row of pixels is read out at the same time(i.e. simultaneously or on one clock cycle)). Furthermore, Borg teaches that the operational amplifier(38) produces a substantially average signal from all the dark reference signals("By shorting the sense nodes of many reference pixels together, differences in the dark current from pixel to pixel, as well as shot noise associated with the dark current are averaged out" paragraph 0025. The outputs from the pixels are shorted together into the operational amplifier(38) with a common mode voltage Vcm, and an average dark reference signal is output. Paragraphs 23 and 25).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to combine the outputs of all of the sample and hold circuits of Rossi et al., as Borg does with the outputs of all the dark reference pixels, and read the dark reference values out to the operational amplifier simultaneously or on one clock cycle as taught by Borg, in order to produce an average dark reference signal from the operational amplifier, in which the signal more accurately compensates for noise and other influences to which the pixel cells are subjected(Borg, paragraphs 0007 and 0025).

Consider claim 7, and as applied to claim 6 above, Rossi et al. further teaches:

each of the sample and hold circuits further comprises a charge storage element(Cvsig and Cvrst, see figure 3c) mated to each signal from the dark reference pixels(see figure 3c, the each column line represents the output from one dark pixel. Cvsig is mated to the Vsig signal of a dark pixel and Cvrst is mated to a Vrst signal of a dark pixel.), wherein a signal from each charge storage element(Cvsig and Cvrst, figure 3c) is passed to the operational amplifier(See figure 3b, Vsig and Vrst signals are fed into the two opposite terminals of the operational amplifier respectively. Column 4, lines 30-35).

Consider claim 8, and as applied to claim 5 above, Rossi et al. further teaches of providing a differential operational amplifier(35) as the operational amplifier(The sample and hold circuits(33) produce a two signals for each pixel, Vsig and Vrst. These signals

are subtracted using a differential amplifier to produce a dark current signal that is used as a reference. Column 4, lines 28-35)

Consider claim 9, and as applied to claim 5 above, Rossi et al. further teaches that step (a) further comprises transferring the pixel signals from the plurality of pixels to the plurality of storage elements(sample and hold circuits) on a row-by-row basis("The sample and hold circuits 33 sample signals from array 30 row-by-row" column 4, lines 25-29).

Consider claim 10, Rossi et al. teaches:

A camera(The image sensor is used to capture visible light(i.e. it functions as a camera)column 1, line 15) comprising:

An image sensor(figures 3a 3b and 3c) comprising:

(a) a plurality of active pixels(figure 3a, 32, "clear pixels") that receives incident light that is converted into a charge("Imaging sensors are used to capture visible light", column 1, line 15);

(b) a plurality of storage element circuits(sample and hold circuits(33));

(c) a plurality of dark reference pixels(figure 3a, "FIG. 3a shows peripheral areas 31 of a pixel array 30 which contains dark pixels from which dark current measurements are taken: The dark pixels in peripheral areas 31 are read-out using the same signal path and timing diagram as for clear pixels in area 32 which are used for imaging." Column 4, lines 18-22) each of which is responsive to light(because the dark pixels are

constructed on the same image sensor as the light ones(figure 3a), they are thus, responsive to light), wherein signals from each of the dark reference pixels is transferred to one of the storage element circuits(The dark pixels in peripheral areas 31 are read-out using the same signal path and timing diagram as for clear pixels in area 32 which are used for imaging." Column 4, lines 18-22. Each pixel provides two signals, Vsig and Vref to a sample and hold circuit(33). Column 4, lines 45-49); and

(d) an operational amplifier that receives a signal from each of the sample and hold circuits(35, figure 3b, column 4, lines 33-35. The pixels are transferred to a differential amplifier(i.e. operational amplifier, 35) where they are subtracted.), wherein the operational amplifier(35) produces a signal from the signals from the sample and hold circuits(The sample and hold circuits(33) produce two signals for each pixel, Vsig and Vrst. These signals are subtracted to produce a dark current signal that is used as a reference. Column 4, lines 28-35) for providing an approximate dark reference pixel (The signals output a dark reference signal which is input into an image processor(37), which uses the dark reference signals to perform sensor temperature calculations. Column 4, lines 36-40)

However, Rossi et al. does not explicitly teach that the dark pixels contained in the peripheral area of the pixel array, as shown in figure 3a, are substantially shielded from light. Rossi et al. does not explicitly teach that the pixels are read out simultaneously, or on one clock cycle, from the sample and hold circuits(33). Nor does Rossi et al. teach that the operational amplifier(35) produces a substantially average signal from all the signals in the sample and hold circuits(33).

Borg teaches of improving a reference signal obtained from dark pixels. Borg teaches that an improved reference signal is needed because many reference signals do not accurately compensate for noise and other influences to which pixel cells are subjected(paragraph 0007). Like, Rossi et al., Borg teaches of a plurality of dark reference pixels(3, figure 2, numbers 21, 31, and 41 refer to columns of dark reference pixels, paragraph 0020). Also like Rossi et al., Borg teaches that the dark pixel outputs are fed into an operational amplifier(38, figure 2) to produce a reference signal(see figure 2, paragraph 0022).

However, in addition to the teachings of Rossi et al., Borg teaches that the dark pixels are substantially shielded from light("covered with an opaque filter that blocks light", paragraph 0021). In addition, Borg teaches that the pixels are read out simultaneously, or on one clock cycle(The pixels are read out "on a row-by-row basis", paragraph 0018. Reading pixels out "row-by-row" means that an entire row of pixels is read out at the same time(i.e. simultaneously or on one clock cycle)). Furthermore, Borg teaches that the operational amplifier(38) produces a substantially average signal from all the dark reference signals("By shorting the sense nodes of many reference pixels together, differences in the dark current from pixel to pixel, as well as shot noise associated with the dark current are averaged out" paragraph 0025. The outputs from the pixels are shorted together into the operational amplifier(38) with a common mode voltage Vcm, and an average dark reference signal is output. Paragraphs 23 and 25).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to combine the outputs of all of the sample and hold circuits

of Rossi et al., as Borg does with the outputs of all the dark reference pixels, and read the dark reference values out to the operational amplifier simultaneously or on one clock cycle as taught by Borg, in order to produce an average dark reference signal from the operational amplifier, in which the signal more accurately compensates for noise and other influences to which the pixel cells are subjected(Borg, paragraphs 0007 and 0025).

Consider claim 12, and as applied to claim 11 above, Rossi et al. further teaches:

each of the sample and hold circuits further comprises a charge storage element(Cvsig and Cvrst, see figure 3c) mated to each signal from the dark reference pixels(see figure 3c, the each column line represents the output from one dark pixel. Cvsig is mated to the Vsig signal of a dark pixel and Cvrst is mated to a Vrst signal of a dark pixel.), wherein a signal from each charge storage element(Cvsig and Cvrst, figure 3c) is passed to the operational amplifier(See figure 3b, Vsig and Vrst signals are fed into the two opposite terminals of the operational amplifier respectively. Column 4, lines 30-35).

Consider claim 13, and as applied to claim 10 above, Rossi et al. further teaches of providing a differential operational amplifier(35) as the operational amplifier(The sample and hold circuits(33) produce a two signals for each pixel, Vsig and Vrst. These signals are subtracted using a differential amplifier to produce a dark current signal that is used as a reference. Column 4, lines 28-35)

Consider claim 14, and as applied to claim 10 above, Rossi et al. further teaches that step (a) further comprises transferring the pixel signals from the plurality of pixels to the plurality of storage elements(sample and hold circuits) on a row-by-row basis("The sample and hold circuits 33 sample signals from array 30 row-by-row" column 4, lines 25-29).

Conclusion

22. All objections made to the specification or claims by the Examiner are hereby withdrawn in view of Applicant's response.

23. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Albert H. Cutler whose telephone number is (571)-270-1460. The examiner can normally be reached on Mon-Fri (7:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ngoc-Yen Vu can be reached on (571)-272-7320. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AC

NGOC-YEN VU
SUPERVISORY PATENT EXAMINER